

Effects of Section 404 Permits on Wetlands in North Dakota

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By Natalie R. Sexton

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Frontispiece: Shorebirds feeding in an ephemeral wetland typical of North Dakota. *Photo by F. Knopf.*

Effects of Section 404 Permits on Wetlands in North Dakota

by

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Abstract. I reviewed 87 wetland alterations from discharges of dredged or fill material in the prairie pothole region of North Dakota. The discharges were authorized by nationwide permits (NWP) 13, 14, and 26 and by individual permits issued by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act during 1987–1991. For each discharge, I assessed the magnitude and purpose, the affected wetland type, the compliance of the permit holder with the permit conditions, and the corps' acceptance of recommendations by resource agencies for special conditions for individual permits. Nearly 117,748 m³ of material were placed into wetlands by 42 discharges, 13 ha of wetlands were altered by 13 discharges, and 1,192 m of shoreline were modified by 15 discharges. Most discharges were made into palustrine and riverine wetlands. Compliance by permit holders with special conditions was 85%. The corps accepted 74% of the recommended special conditions by resource agencies for individual permits. Ninety percent of the special conditions of individual permits were implemented by applicants. The effect on any one wetland from a discharge authorized by NWP 13 or NWP 14 seems to have been minimal; however, cumulative effects were not determined. The types and sizes of discharges authorized by NWP 26 were variable and did not seem to meet certain regulatory requirements, for example, that they be similar in nature and have minimal individual and cumulative effects. Compliance by permit holders with permit conditions was greater than 75%. However, because some special conditions for individual permits pertained to implementation, compliance could not always be determined. More follow-up is needed of permitted discharges during and after implementation.

Key words: Clean Water Act, prairie potholes, Section 404, wetland losses, wetland permits, wetland alterations.

This study was conducted to review wetland alterations (any change in a wetland from an authorized discharge of dredged or fill material) under Section 404 of the Clean Water Act (33 U.S.C. 1344) in the prairie pothole region of North Dakota. The study was planned in cooperation with the Ecological Services Office of the U.S. Fish

and Wildlife Service in North Dakota, the Bismarck Regulatory Office of the U.S. Army Corps of Engineers, and the National Ecology Research Center of the National Biological Survey (formerly of the U.S. Fish and Wildlife Service) in Fort Collins, Colorado.

Few studies of authorized wetland alterations under Section 404 have been published. A review of the effects of such alterations in the Platte River basin of Colorado (Gladwin et al. 1992) and in

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10 counties in north central California (Gladwin and Roelle 1992) raised several questions about the Section 404 regulatory program in general and about Nationwide Permit 26 in particular. In 1992, personnel in the Ecological Services Office of the U.S. Fish and Wildlife Service in Sacramento, California, identified the loss of 294 ha of wetlands from 775 authorized discharges during a 6-year period. Required compensatory mitigation of the losses was not determined (M. M. Long, M. Friley, D. Densmore, and J. De Weese, U.S. Fish and Wildlife Service, Sacramento, California, unpublished report).

Their high density and variable, dynamic water regimes make wetlands in the prairie pothole region of North Dakota a unique and valuable resource for vegetation, wildlife, and humans (Mitsch and Gosselink 1993). Most wetlands in this area are palustrine emergent wetlands that are either tem-

porarily, seasonally, semi-permanently, or permanently flooded (Cowardin et al. 1979; Fig. 1). Before European settlement, there were about 2 million ha of wetlands in North Dakota; however, as of 1984, only about 800,000 ha or 40% remained (Leitch and Baltezare 1992). Because these wetlands are important to so many species, including humans, information on their status is vital to wetland management and policy formulation.

My objectives for this study were to (1) determine the magnitude and purposes of discharges authorized by nationwide permits 13, 14, and 26 and by individual permits in the prairie pothole region of North Dakota, (2) review compliance by permit holders with the conditions of these permits, (3) evaluate the U.S. Army Corps of Engineers' acceptance of resource-agency recommendations for special conditions for individual permits, and



Fig. 1. The prairie pothole region of North Dakota. *Photo by W. Bicknell.*

(4) evaluate implementation of special conditions of individual permits by permit holders.

Section 404 Regulations

The U.S. Environmental Protection Agency administers the Clean Water Act and authorizes the Department of the Army to regulate discharges of dredged or fill material into waters of the United States, including many wetlands. Since 1972, the corps has regulated these discharges following the Section 404(b)(1) Guidelines of the Clean Water Act, Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. 230). These discharges require permits from the corps.

In accordance with these guidelines and with the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e), the corps must solicit comments about the feasibility and desirability of a proposed discharge from the U.S. Fish and Wildlife Service (service), the Soil Conservation Service, the National Marine Fisheries Service, the Bureau of Reclamation, some state agencies, and the public before issuing a permit. Water-quality certification under Section 401 of the Clean Water Act is also required. In North Dakota, the state resource agencies include the Game and Fish Department, the State Historical Society, and the Division of Water Quality of the North Dakota Department of Health and Consolidated Laboratories.

The corps must determine whether the proposed discharge complies with the 404(b)(1) Guidelines and is in the best interest of the public. Based on this determination, the corps either authorizes the proposal, modifies the proposal by including special conditions as part of the permit, or denies the request for the discharge.

Section 404 authorizes two types of permits: general and individual permits. General permits are for discharges that are considered to be similar in nature and to cause only minimal adverse environmental effects when performed separately or cumulatively (40 CFR 230.7). A nationwide permit (NWP) is a form of general permit designed to authorize a discharge for a specific purpose with little, if any, delay or paperwork by the corps. A nationwide permit is valid only if the proposed discharge meets the conditions of a specific nation-

wide-permit category. The corps authorizes 36 categories of discharges under nationwide permits, including 10 new categories that were added when the regulations were revised in January 1992 (33 C.F.R. 330). Many discharges authorized under nationwide permits do not require notification of the corps before or after they are made, and therefore there is little oversight by the corps or by other resource agencies. Nationwide permits cover discharges for a wide variety of purposes including backfill for utility lines, bank stabilization, installation of water intake structures, and minor road construction.

Most Section-404 permits issued by the corps in North Dakota are nationwide permits. Five NWPs account for 95% of the Section-404 permits (U.S. Fish and Wildlife Service, unpublished report). Although the regulations for nationwide permits were last revised in 1992, the following descriptions of nationwide permits that I reviewed are based on the 1986 regulations (33 C.F.R. 330).

Nationwide Permit 13 authorizes stabilization of river, stream, and lake banks to prevent erosion (Fig. 2). Stabilization material must be less than 152.5 m* in length and not more than 0.8 m³/0.3 m** may be placed below the ordinary high water mark. Stabilization material must be free of waste-metal products, organic materials, asphalt, unsightly debris, and other deleterious material. In North Dakota, most banks are stabilized with riprap.

Nationwide Permit 14 authorizes placement or replacement of fill for minor road crossings of waters of the United States, including upgrades (Fig. 3). This permit allows placement of as many as 153 m³† of fill material below the ordinary high water mark. The crossing must be made with a culvert or with a bridge or must otherwise be designed to maintain the normal circulation and flow of water. In addition, discharges into adjacent wetlands must not extend beyond 30.5 m‡ on either side of the crossed waterbody.

Nationwide Permit 26 (1-10 acres) [sic] is for discharges into 0.4-4.0 ha of nontidal isolated wetlands (i.e., not part of a surface tributary system to

* 500 ft.

** 1 yd³/running ft.

† 200 yd³.

‡ 100 ft.

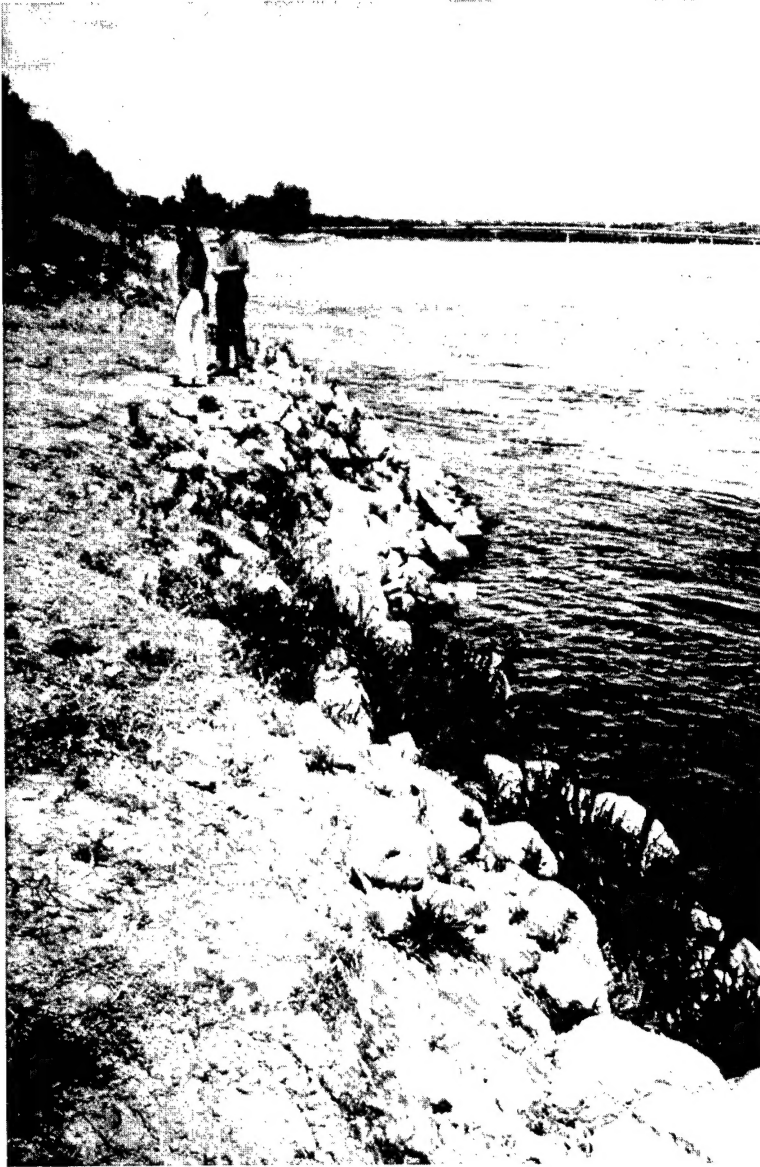


Fig. 2. A bank stabilization authorized under Section 404 of the Clean Water Act by Nationwide Permit 13 in North Dakota, 1987–1991. *Photo by N. R. Sexton.*

interstate waters or navigable waters of the United States) or wetlands above the headwaters of a stream where the average annual flow is less than $142 \text{ cm}^3/\text{s}$ [§]. Applicants must notify the corps of such activities. The corps explains the purpose of the proposed discharge to regulatory and resource agencies by issuing a predischage notification. Agencies have a brief period (usually 5 to 15 days) to review the notification, develop recommendations, and submit comments to the corps. The corps

[§] $5 \text{ ft}^3/\text{s}$.

must respond to the applicant within 20 days (the period was changed to 30 days in the 1992 modifications), or the applicant may proceed with construction.

Nationwide Permit 26 (<1 acre) [*sic*] allows discharges into less than 0.4 ha of nontidal wetlands that are isolated or above the headwaters of a stream (Fig. 4). NWP 26 is unique because it regulates an amount of fill irrespective of the purpose of the fill. Therefore, the types of discharges permitted under NWP 26 are highly variable. This subset of NWP 26 does not require a predischage notification.

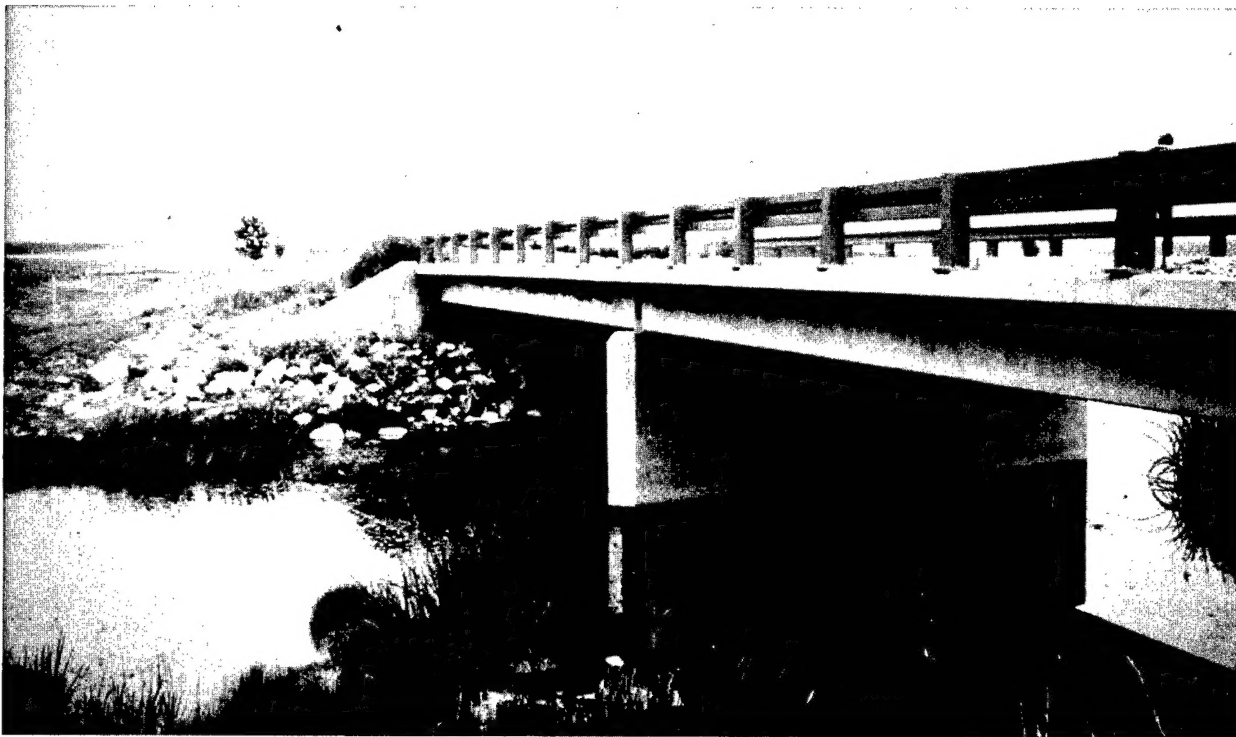


Fig. 3. A bridge replacement authorized under Section 404 of the Clean Water Act by Nationwide Permit 14 in North Dakota, 1987–1991. *Photo by N. R. Sexton.*

Discharges of dredged or fill material authorized by NWP 26 (<1 acre), NWP 14, and NWP 13 may be made without notifying the corps. Therefore, natural-resource and regulatory agencies may not have an opportunity to review the potential effects of those discharges on the environment. However, applicants are encouraged to notify the corps to ensure that the intended discharges comply with the terms and conditions of a nationwide permit and that the Clean Water Act is not violated.

Individual permits authorize discharges that are usually larger and more complex than permitted under nationwide permits and are thought to have significant effects on the environment (Fig. 5). Issuance or denial of a permit often takes 4–6 months and involves a detailed evaluation of the proposed discharge. Before an application is submitted, the prospective applicant meets with representatives of the corps and of other federal and state agencies to discuss the proposed discharge, to review potential environmental effects, and, if applicable, to develop practicable alternatives that are less damaging to the environment than the proposed discharge.

When an application is accepted, the corps issues a public notice that describes the proposed discharge to solicit written comments from federal and state agencies and from the public about the possible effects of the discharge. After expiration of the 30-day comment period, the corps considers all comments and reviews the proposed discharge for compliance with the 404(b)(1) Guidelines. The corps also determines the need for mitigation of wetland loss if a permit is issued. Mitigation is specified by special conditions of the permit.

Methods

File Examinations

In May and June 1992, I reviewed files of the Bismarck Regulatory Office of the corps and of the Ecological Services office of the U.S. Fish and Wildlife Service on all discharges authorized by individual permits and by nationwide permits 13, 14, and



Fig. 4. A discharge of fill material into a wetland authorized under Section 404 by Nationwide Permit 26 (<1 acre) [sic] in North Dakota, 1987–1991. Photo by N. R. Sexton.

26 during January 1987 through December 1991. My selection of these permit types was based on several factors including frequency of use, potential effects of each permit on wetlands, feasibility of monitoring, and interest expressed by corps and service personnel. Three factors influenced the selection of this time frame: (1) personnel of the Regulatory Office and the Ecological Services office in Bismarck recommended this period because in 1987, the North Dakota state legislature enacted a no-net-loss program for wetlands (D. A. Spryncynatyk, North Dakota State Engineers, Bismarck, North Dakota, unpublished report); (2) also in 1987, the Bismarck Regulatory Office began more critical reviews of proposed discharges into wetlands to minimize the loss of wetland values; and (3) permits after 21 January 1992 were issued under the revised and expanded set of nationwide permits. Few

discharges had been authorized under the revised regulations when I began my study.

Because inspections of all discharges that were permitted during 1987–91 were not feasible, I randomly selected a subset of discharges in the prairie pothole region of North Dakota (Fig. 6). I excluded all livestock-watering ponds and wildlife-habitat enhancements from my study because service and corps personnel believed the effects on wetlands from discharges of these types were less uncertain. Inclusion of an authorized discharge in my review depended on (1) adequate information in the files about the location and type of discharge; (2) permission of the private landowner to visit the site of the discharge; and (3) completion of the proposed discharge and, if applicable, the mitigation. Mitigation, for this study, refers to the fifth part of the definition developed by the Presidents' Council on

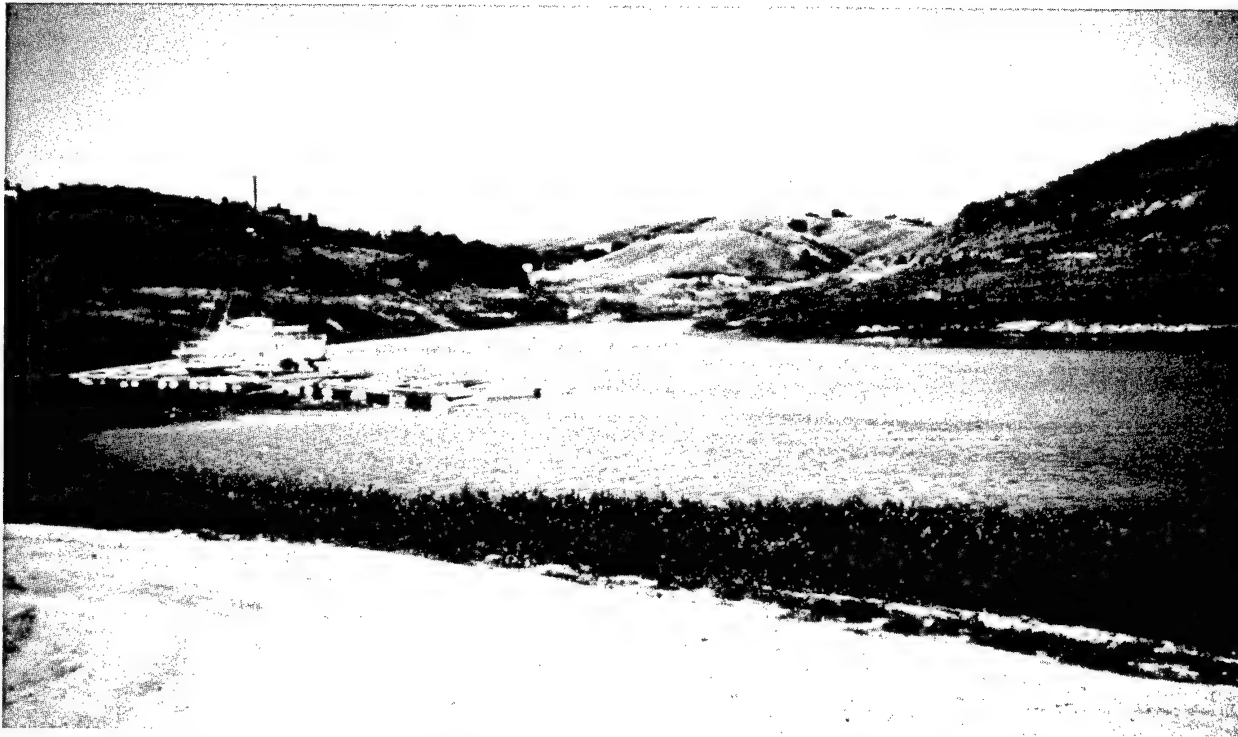


Fig. 5. A discharge of fill material into a wetland for a boating activity (development of a marina) authorized under Section 404 of the Clean Water Act by an individual permit in North Dakota, 1987–1991. *Photo by N. R. Sexton.*

Environmental Quality: compensation for the impact by replacing or providing substitute resources or environments (40 C.F.R. 1500–1508).

From the files, I identified the following for each reviewed discharge: (1) location of the discharge (including county, section, township and range, ownership, and waterbody), (2) purpose and magnitude of the discharge, (3) resource-agency recommendations (if applicable), (4) and special permit conditions (if applicable). I recorded the magnitudes of the wetland alterations, summarized the comments and recommendations of resource agencies on the predischARGE notifications and public notices, and determined the extent of the corps' acceptance of those recommendations as special conditions of the permits.

National Wetlands Inventory (NWI; U.S. Fish and Wildlife Service, Boston, Massachusetts, unpublished report) maps and aerial photographs of North Dakota provided baseline information on wetlands before discharges were made and allowed me to identify the affected wetland types (Cowardin et al. 1979). If information in the file was inade-

quate to locate the discharge on a NWI map or the map did not indicate a wetland in the discharge location, the wetland type was recorded as "unknown."

Field Examinations

Between June and August 1992, I visited each altered wetland. A representative from the Bismarck Regulatory Office of the corps accompanied me on these visits. During these visits, we attempted to determine each permit holder's compliance with conditions of the permit and to verify the magnitude of the alteration and the stated purpose of the discharge. We determined the magnitudes of the alterations by visual estimations and measurements in the field with a distance-measuring wheel and by pacing. We also examined the appropriateness of the material and its effectiveness in stabilizing a water-body bank (NWP 13); the existence of a culvert and circulation and flow of water in the wetland basin or stream channel (NWP 14); and, if applicable, implementation

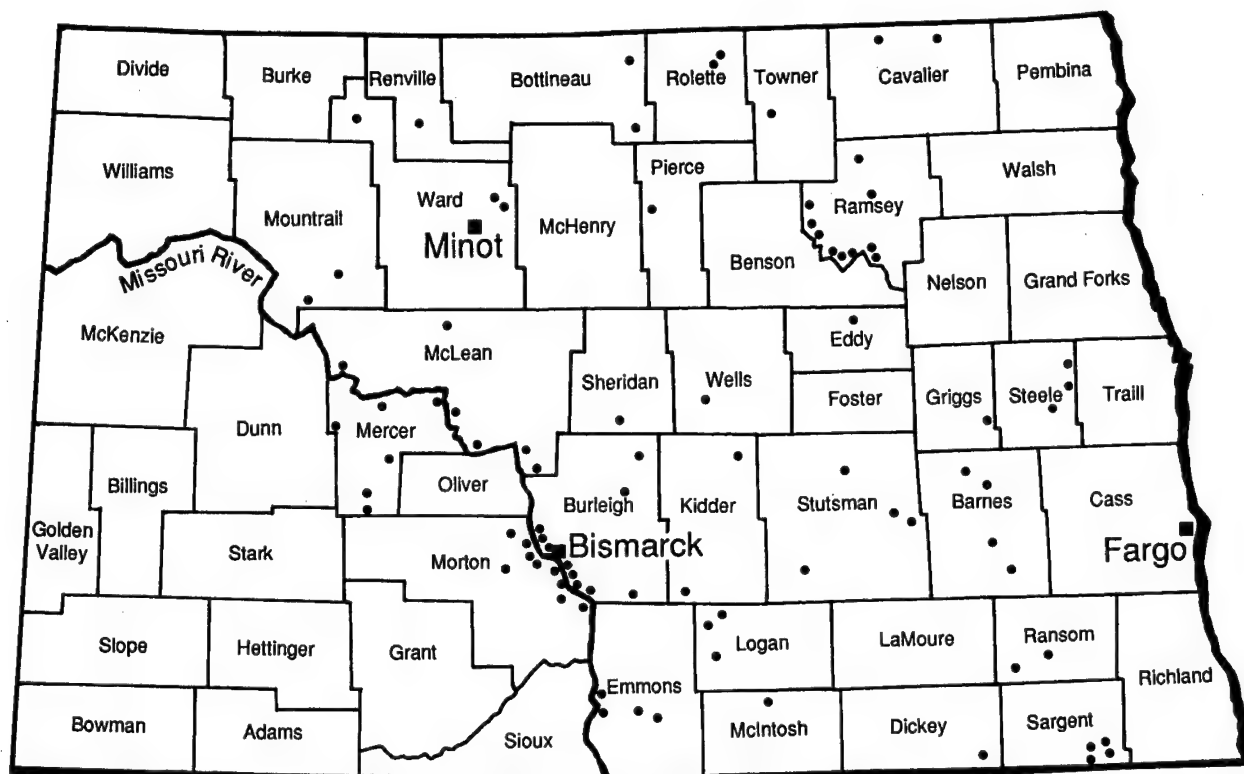


Fig. 6. Locations of the 87 discharges reviewed for this study. Discharges were authorized under Section 404 of the Clean Water Act by nationwide permits 13, 14, and 26 and by individual permits; prairie pothole region of North Dakota, 1987–1991.

of the special conditions of the permit, including mitigation, by permit holders of NWP 26 (1–10 acres) and of individual permits. I compared the expected and observed magnitudes of the wetland alterations by determining the mean percent difference between the sizes of the stated alterations in the files and the actual sizes observed in the field. To gain a better understanding of the Section-404 regulatory process, I also attended inter-agency meetings between the corps, service, Soil Conservation Service, and state agencies that were held to discuss concerns about proposed discharges.

Results

According to records of the Bismarck Regulatory Office of the corps, 642 permits were author-

ized in North Dakota by NWP 13, NWP 14, NWP 26 (<1 acre), NWP 26 (1–10 acres), and individual permits from 1987 through 1991 (numbers do not include livestock-watering ponds or wildlife-habitat enhancements; Table 1). I reviewed the files and visited 87 of the 642 authorized discharges. During on-site inspections, I obtained complete information for 70 of the 87 wetland alterations. I reviewed only three discharges authorized under NWP 26 (1–10 acres) because most (83%) were either wetland enhancements or were not yet implemented at the time of my inspection. All private landowners but one granted permission to visit the sites of the discharges.

Magnitude of Wetland Alterations

A total of 118,743 m³ of dredged or fill material were placed into wetlands by 42 discharges, 12.6 ha of wetlands were altered by 13 discharges,

Table 1. Number of discharges of fill material into wetlands authorized under Section 404 of the Clean Water Act by nationwide permits (NWP) 13, 14, and 26 and by individual permits; prairie pothole region of North Dakota, 1987–1991. Parenthetical entries in the table field are numbers of discharges I reviewed for this study.

Year	NWP 13	NWP 14	NWP 26 ^{a,b} (<1 acre) [sic]	NWP26 ^b (1–10 acres) [sic]	Individual permits
1987	10 (1)	16 (1)	36 (2)	3 (0)	9 (2)
1988	15 (5)	33 (10)	43 (4)	3 (0)	15 (6)
1989	21 (2)	28 (7)	57 (7)	7 (2)	17 (8)
1990	17 (6)	24 (3)	124 (8)	6 (0)	5 (0)
1991	5 (2)	15 (5)	123 (5)	7 (1)	3 (0)
Total	68 (16)	116 (26)	383 (26)	26 (3)	49 (16)

^a Numbers do not include discharges for the construction of livestock watering ponds.

^b Numbers do not include discharges for the enhancement of wildlife habitats.

and 1,192 m of shoreline were stabilized by 15 discharges. The mean percent difference between the expected and the observed wetland alterations from all permitted discharges except those under NWP 26 (<1 acre) was less than 10% (Table 2). The reason for a high difference of 147% by NWP 26 (<1 acre) was that one observed discharge was substantially larger than stated in the application. When that discharge was removed from the calculations, the mean difference was 6%.

20% was for bank stabilizations (Table 3). Discharges for bridge replacements (2,711 m³) or for bridge construction (4.0 ha) accounted for the greatest wetland alterations and were followed by the magnitudes of discharges for road upgrades (2,676 m³) and road crossings (1.4 ha). More discharges were made into palustrine wetlands (34%) than into riverine (30%), lacustrine (23%), or unknown (13%) wetland types (Fig. 7).

Purposes of Discharges and Affected Wetland Types

Twenty-eight percent of the authorized discharges was for road upgrades or crossings and

Compliance by Permit Holders

Eighty-five percent of the 87 permit holders complied with all conditions of their permits, and only 7% failed to comply with at least one condition (Table 4). Compliance was greater by holders

Table 2. Comparisons of expected and observed wetland alterations from 70 discharges of fill material authorized under Section 404 of the Clean Water Act by nationwide permits (NWP) 13, 14, and 26 and by individual permits; prairie pothole region of North Dakota, 1987–1991. Expected alterations are based on figures in permit applications submitted to the U.S. Army Corps of Engineers. Mean-percent difference is the average difference between the expected and observed alterations. The parenthetical entries in the table field are the English units of measure that are used in the regulatory program of the U.S. Army Corps of Engineers.

Alterations	NWP 13	NWP 14	NWP 26 (<1 acre) [sic]		NWP 26 (1–10 acres) [sic]	Individual permits	
			Volume	Area		Volume	Area
n	15	19	8	9	3	15	1
Expected	1,192 m (3,910 feet)	2,057 m ³ (2,691 yd ³)	5,331 m ³ (6,972 yd ³)	1.6 ha (4.0 a)	7.0 ha (17.3 a)	110,188 m ³ (144,112 yd ³)	4.0 ha (9.8 a)
Observed	1,191 m (3,905 feet)	2,062 m ³ (2,697 yd ³)	5,249 m ³ (6,865 yd ³)	1.9 ha (4.7 a)	6.8 ha (16.8 a)	104,196 m ³ (136,275 yd ³)	4.0 ha (9.8 a)
Mean % difference	4%	4%	147%		5%	9%	

Table 3. Purpose of 87 discharges of fill material into wetlands authorized under Section 404 of the Clean Water Act by nationwide permits 13, 14, and 26 and by individual permits; prairie pothole region of North Dakota, 1987–1991. Parenthetical entries are percentages.

Purpose	n
Road crossing or road upgrade	24 (28)
Bank stabilization	17 (20)
Bridge replacement or construction	16 (18)
Dam modification or construction	11 (13)
Boating (i.e., pier construction)	10 (11)
Commercial development (i.e., construction of a parking lot)	4 (5)
Miscellaneous	3 (3)
Channel cleaning	2 (2)
Total	87 (100)

of NWP 13 (100%) than by holders of NWP 14 (92%), NWP 26 (<1 acre; 77%), individual permits (75%), and NWP 26 (1–10 acres; 67%). Some discharges (3%) were greater than described in the files, but none of the discharges exceeded the maximum fill under the permit types. Five percent of the permit holders did not follow the implementation plans that appeared in the files but still did not violate the conditions of the permits. These cases were not considered to be in compliance or non-compliance but were placed in separate categories. In four cases, I questioned whether the issued permit types were appropriate for the purposes of the proposed discharges. However, all of these permit holders complied with the conditions of the permits issued and were considered to be in full compliance.

Mitigation

Mitigation was required for three of the 87 discharges I reviewed. Mitigation was a special condition of two individual permits and required for one discharge authorized by NWP 26 (1–10 acres). Required mitigation for the two individual permits included the restoration of part of the original wetland affected by a discharge and the replacement of mature riparian timber that had been cut. Mitigation for two of the three discharges had not been implemented when I visited the sites. Although mitigation was not required for any discharges authorized by NWP 26 (<1 acre), it was offered by two permit applicants. It was also offered by two NWP 26 (1–10 acres) applicants.

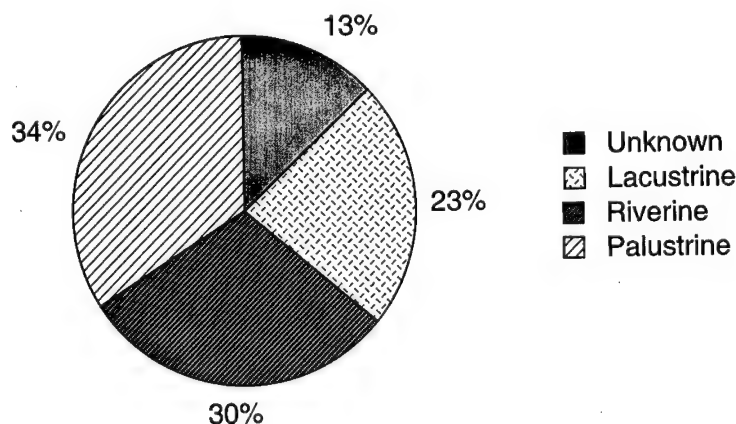


Fig. 7. Wetland types affected by the 87 discharges of fill material into wetlands reviewed for this study. Discharges were authorized under Section 404 of the Clean Water Act by nationwide permits 13, 14, and 26 and by individual permits; prairie pothole region of North Dakota, 1987–1991.

Table 4. Compliance with special conditions for 87 discharges of fill material into wetlands under Section 404 of the Clean Water Act with nationwide permits (NWP) 13, 14, and 26 and individual permits; prairie pothole region of North Dakota, 1987–1991. Parenthetical entries in the table field are the compliance rates.

Compliance by permit holders	NWP 26		NWP 26		Individual	
	NWP13	NWP14 (<1 acre) [sic]	(1–10 acres) [sic]	permits	Total	
Complied with all conditions of permit	16 (100%)	24 (92%)	20 (77%)	2 (67%)	12 (75%)	74 (85%)
Did not comply with at least one condition of permit	0	1 (4%)	1 (4%)	1 (33%)	3 (19%)	6 (7%)
Fill greater than stated, but met requirements ^a	0	1 (4%)	2 (8%)	0	0	3 (3%)
Change in plans, but met requirements ^b	0	0	3 (11%)	0	1 (6%)	4 (5%)
Total	16	26	26	3	16	87

^a Discharges were greater than stated on the permit applications but did not exceed the permitted sizes of the discharges.

^b The implemented plans differed from those described in the permit applications but did not violate the special conditions of the permits.

Nationwide Permit 13

Nationwide Permit 13 was the least complex of the permit types I reviewed, and compliance with it was 100%. This compliance rate was probably due to the purpose of discharges with this permit in North Dakota. Most applicants requested permission to stabilize banks on their waterfront-home or cottage sites. Each property I visited was well maintained. The property owners used safe, durable, aesthetically pleasing material to protect their residences and properties. Most banks seemed to be well stabilized, although many had not been tested by time or floods.

Nationwide Permit 14

There were no indications of major harm to wetlands from discharges authorized by NWP 14. Most of these discharges were for upgrading or replacing roads where the primary impacts were from the original construction and not from the upgrade or replacement. I was unable to determine whether practicable alternatives existed for the road upgrades and replacements because information on the physical conditions of the original facilities was not available in the files I inspected.

Most placements of fill material with NWP 14 for road crossings or upgrades in North Dakota are made by engineering firms hired by counties or by townships. Four engineering firms were involved

in 14 (54%) of the 26 reviewed discharges. Based on my inspections, these firms seemed to have followed the Section 404(b)(1) Guidelines.

Nationwide Permit 26

The discharges authorized by NWP 26 in this study were variable and had only the size of the discharge in common (i.e., <0.4 ha). The discharges were for a variety of purposes in four of eight categories (Table 3): road upgrades or crossings, dam modifications or construction, bridge replacements, and boating.

Because most (83%) discharges under NWP 26 (1–10 acres) were issued for either wetland enhancements or had not been completed at the time of my review, I could review only three. Conclusions cannot be drawn from such a small sample size. In North Dakota, NWP 26 (1–10 acres) is issued primarily for wetland enhancements to increase habitat diversity and to benefit wetlands. I did not conduct on-site inspections of these enhancements, but the permit applications were accompanied by detailed, site-specific development plans.

Individual Permits

Collectively, the U.S. Fish and Wildlife Service, Soil Conservation Service, Environmental Protection Agency, North Dakota Game and Fish

Department, and the other state agencies made 50 recommendations for the 16 individual permits (Table 5). The corps incorporated 74% of those recommendations into the special conditions of the permits. Fourteen percent of the recommendations were not accepted by the corps. The reasons for nonacceptance could not be determined. Twelve percent of the recommendations were not accepted by the corps but were addressed by the applicants before the permits were issued, usually in the form of a verbal or written agreement to abide by the recommendation(s).

The 16 reviewed individual permits collectively had 171 special conditions. Seventy-two (42%) of the conditions were implemented, and eight (5%) were not implemented (Table 6). I was unable to determine implementation of 91 (53%) of the special conditions. Many of these conditions applied to precautionary measures during construction to maintain water quality and to appropriately implement the project within the bounds of the permit.

Discussion

Magnitude of Wetland Alterations

The estimated magnitude of the total wetland alterations based on permit files is probably not a

true reflection of the magnitude of the total alterations during 1987–91. Because notification of the corps is not mandatory for discharges authorized by NWP 13, 14, and 26 (<1 acre), some wetland alterations, including violations, are not detected. Furthermore, many discharges authorized by individual permits are much larger than those reviewed in this study. This suggests that, in spite of the permit holders' high compliance with permit conditions, an unquantified loss of wetlands is being permitted legally through the regulatory process. Further study to determine the extent of this loss and the associated cumulative effects is needed. Additional monitoring by federal, state, and private entities is important for determining the direct and indirect effects of discharges of fill material into wetlands.

Furthermore, the actual sizes of some discharges were larger than the proposed sizes. These differences make monitoring effects of discharges difficult. This is especially true when trying to monitor the cumulative effects of such discharges on wetlands. For the corps to effectively regulate the cumulative effects of discharges into wetlands, it must know the magnitudes of those discharges. One discharge that exceeds the permitted discharge by, for example, only 0.25 ha may seem insignificant. However, the additive effect of these unauthorized discharges may be a serious loss of wetlands in the United States.

Table 5. Recommended stipulations by federal and state resource agencies for 16 individual permits for discharges of fill material into wetlands under Section 404 of the Clean Water Act and their acceptance by the U.S. Army Corps of Engineers as special conditions of the permit; prairie pothole region of North Dakota, 1987–1991. Parenthetical entries are percentages.

Recommended stipulations	Accepted	Not accepted	Not accepted but addressed ^a	Total
Construction protocols	6 (60)	2 (20)	2 (20)	10
Hydrologic management and control	6 (60)	3 (30)	1 (10)	10
Dredged and fill material management	8 (89)	0	1 (11)	9
Vegetation management and erosion control	8 (89)	1 (11)	0	9
Fish and wildlife management	7 (88)	1 (12)	0	8
Agency consultation ^b	0	0	2 (100)	2
Wetland restoration or creation	2 (100)	0	0	2
Total	37 (74)	7 (14)	6 (12)	50

^a Includes recommendations that the corps did not accept but that the applicant addressed during the permitting process.

^b For example, obtaining information on replanting mixtures from the U.S. Soil Conservation Service.

Table 6. Implementation of special conditions by holders of 16 individual permits for discharges of fill material into wetlands under Section 404 of the Clean Water Act; prairie pothole region of North Dakota, 1987–1991. Parenthetical entries are percentages.

Special conditions	Implemented	Not implemented	Unknown ^a	Total
Management of dredged and fill material	26 (63)	4 (10)	11 (27)	41
Management of vegetation and control of erosion	27 (84)	2 (6)	3 (9)	32
Construction protocols	8 (10)	0	69 (90)	77
Hydrologic management and control	6 (50)	1 (8)	5 (42)	12
Management of fish and wildlife resources	4 (57)	1 (14)	2 (29)	7
Restoration or creation of wetlands	1 (50)	0	1 (50)	2
Total	72 (42)	8 (5)	91 (53)	171

^a Includes conditions, the implementations of which could not be determined by field investigation.

Compliance by Permit Holders

The 85% compliance rate determined in this study is also influenced by the fact that notification of the corps of discharges authorized by nationwide permits is not always mandatory. Throughout the nation, the corps has regulatory jurisdiction under Section 404 of over 90,000 discharges of dredged or fill material into wetlands each year. Eighty thousand are authorized by general permits, most of which are nationwide permits, and about half of those are made without the corps' knowledge (J. Studt, U.S. Army Corps of Engineers, Chief of Regulatory, Washington, D.C., personal communication). I could review only discharges reported to the corps, which, based on the above, may constitute only half of all discharges authorized by general permits.

The compliance rate by permit holders in my study was lower than the corps' estimated compliance rates in North Dakota (96–98%) and throughout the nation (94–96%; M. Keller, U.S. Army Corps of Engineers, Senior Program Manager, Omaha, Nebraska, personal communication). My estimation was lower probably because I did not consider discharges as being in full compliance if they differed from what was described in the files, even though the permit holders did not exceed the sizes of the discharges that a specific permit type authorizes and did not fail to comply with the conditions of such permits. These cases are usually not considered violations of the Clean Water Act or noncompliances with regulatory and resource agencies. The compliance rate would have been 94% had I included these cases in my calculations. From a

regulatory standpoint, it is important to recognize these categories of discharges because, although they met the permit conditions, they were not consistent with the information in the permit applications.

Nationwide Permits

Nationwide-permit regulations require that discharges of dredged or fill material into waters of the United States "shall be avoided or minimized through the use of other practicable alternatives" (33 CFR 330.6(a)(1)). However, this is difficult to enforce when most NWP discharges are not reviewed by resource agencies and approximately half are not reviewed by the corps. Therefore, mitigation is rarely required for discharges authorized by nationwide permits other than NWP 26 (0.4–4.0 ha), which unlike the other nationwide permits, requires an application and agency review. Under the revised NWP regulations of 1992, the corps can require mitigation for discharges with NWPs when deemed necessary and does solicit agency comments through the predischARGE-notification process on 14 of the 36 nationwide permits. However, the sole purpose of nationwide permits is still to authorize discharges for specific purposes with little, if any, delay or paperwork.

Nationwide Permit 13

The results of this study indicate that bank stabilizations carried out by private landowners on their own properties create few regulatory problems and therefore may not require as much review as other activities. However, development

of general design plans by the corps for the various types of bank stabilization in North Dakota could further increase the effectiveness of small stabilizations constructed by private landowners. Most stabilizations in North Dakota involve placement of riprap along river, prairie stream, or lake shorelines. Corps engineers could prepare plans for these three categories of bank stabilization and provide them to applicants. This would be particularly beneficial to property owners who plan to do the construction without the aid of an engineering plan or a professional contractor.

The bank stabilizations that I inspected fully met the conditions of NWP 13. However, some bank stabilizations result in damage to riparian woodlands. Some of this vegetation, such as plains cottonwood trees (*Populus deltoides* subsp. *monilifera*) is associated with some wetland habitats but is not considered part of a wetland as defined under Section 404. This habitat can be damaged from clearing of vegetation for roads and residential development. These impacts are not regulated by Section 404 of the Clean Water Act. One possible solution would be to incorporate information into the general design plans on the value of riparian habitats to encourage landowners to avoid damage of these areas. This would improve protection of riparian areas, which are rare in North Dakota (Rossiter 1979).

Nationwide Permit 14

In evaluating proposals for road or bridge upgrades and replacements, the corps obtains some information on the physical condition of the existing structures from contacts with the applicants and from visits to selected sites prior to the improvements. However, the corps is not able to do this for every activity. Many times the decision to upgrade or replace a road or bridge is made by the group such as a county or a township that funds the construction. Consulting with these groups and requiring photographs of structures that need to be upgraded or replaced would aid the corps with the evaluation of the need for, potential impacts of, and practicable alternatives to the proposed discharges.

Because of the involvement of engineering firms and state- and county-highway agencies with discharges authorized by NWP 14, communication with these groups is important, especially when regulations are changed or problems arise. This

should insure that these groups have the most current information on the Section-404 regulatory program and continue to rigorously follow the Section-404 guidelines.

Nationwide Permit 26

NWP 26 is the most controversial of all nationwide permits. Because NWP 26 covers such a wide variety of activities, many argue these discharges are not similar in nature as stipulated in the 404(b)(1) Guidelines (Goldman-Carter 1989; Gladwin et al. 1992; Gladwin and Roelle 1992). Furthermore, resource agencies have limited, if any, opportunities to review and comment on proposed discharges of less than 0.4 ha. Considering that most wetland basins in the glacial terrain of central North Dakota are less than 0.4 ha (Cowardin et al. 1981), most prairie wetlands can be filled without any review or notification of the corps. Another consequence of the lack of agency comments is the limited opportunity to develop recommendations for mitigation. Mitigation was not required for any of the reviewed discharges authorized by NWP 26 (<1 acre).

Because of these and other drawbacks, elimination of NWP 26 has been suggested (Goldman-Carter 1989). However, based on my observations, this seems unlikely given the current workloads and limited regulatory budgets of the corps and the commenting agencies. Narrowing the scope of NWP 26 has been tried and seems to be a more feasible approach. For example, in North Dakota in 1992, the corps began investigating the feasibility of transferring regulatory responsibility for livestock watering ponds (regulated under NWP 26) to the Soil Conservation Service. The Soil Conservation Service had been inspecting each site and providing landowners with technical assistance and cost sharing for livestock-watering ponds. Because of this, the corps believed the Soil Conservation Service was in the best position to administer this aspect of the regulatory program, and the agency assumed that responsibility in June 1993. Changes like this, some of which were made by modification of the nationwide permit program in 1992, may reduce the number of different types of discharges authorized under NWP 26 and may ultimately reduce inconsistencies related to this permit type.

Individual Permits

The corps' acceptance of 74% of the recommendations by federal and state resource agencies for individual permits seems low in view of the close coordination between the corps and these agencies in North Dakota. However, 12% of the recommendations that the corps did not accept were addressed by the applicants prior to issuance of the permits.

Implementation rates of special conditions for individual permits were also low. This is more due to my inability to determine implementation than to lack of compliance by permit holders. Implementation of special conditions of individual permits needs to be monitored during and after discharges are made to ensure that all special conditions are met. It is important that the corps and the commenting agencies continue to monitor these authorized discharges at current levels and implement new means to increase monitoring of permitted discharges.

One negative effect of individual permits, like NWP 13, is loss of riparian habitat not regulated under Section 404. This loss occurs from clearing for roads, residential development, and agricultural development. Alterations to riparian habitat are particularly important in a state such as North Dakota where riparian areas comprise less than 1% of the landscape (Rossiter 1979). Although the corps and the resource agencies try to address ancillary alterations (i.e., those not regulated under Section 404) of riparian woodlands that occur during permitted discharges, more emphasis is needed. On a federal level, the Congress should extend wetland protection to riparian areas associated with placement of fill under Section 404 and subsequent development. Statewide regulatory measures to insure this protection could be put into place as well.

Conclusions

The Section-404 regulatory program is complex and requires involvement and cooperation by many groups. Results from my study provide resource and regulatory agencies with information on the strengths and weaknesses of the

Section-404 program. Based on this study, many aspects of the program in North Dakota seem to be effective. However, there are some features that could be improved.

The Section-404 process is valuable because it allows reviews of large, complex discharges that could potentially have significant adverse effects on the environment. Mitigation can avoid or minimize habitat losses and compensate for impacts on the environment. However, the Section-404 process seems to allow few, if any, reviews of small discharges thought to have minor effects on the environment, such as those authorized by nationwide permits. Although nationwide permits are intended to authorize discharges thought to have minimal individual and cumulative environmental effects with little delay or paperwork, this approach does not always provide an accurate evaluation of the environmental effects of proposed discharges. Furthermore, although consideration should be given to individual and cumulative effects of these discharges, a system that allows an accurate evaluation of the cumulative effects on the environment is not in place.

Less than 1% of discharges regulated nationally by the corps are denied (J. Studt, U.S. Army Corps of Engineers, Chief of Regulatory, Washington, D.C., personal communication). This seems low given that the corps regulates more than 90,000 discharges/year. In most cases when a denial is considered, the applicant is encouraged to modify the discharge or withdraw the application so that a denial is not required. This substantially reduces the number of denials that are issued nationwide.

A tracking system with pertinent information on permitted discharges would allow better decisions on proposed discharges. The corps, in cooperation with the service, has been working on implementing such a system with a database and a geographic information system (R. Gebhard, U.S. Fish and Wildlife Service, Region 6 GIS Coordinator, Denver, Colorado, personal communication). Although this system is only in the developmental stages, full implementation of it in all corps regulatory offices is planned.

Interagency cooperation in the form of meetings and other communication can improve the efficiency and effectiveness of the permitting process. This approach has been effective in North Dakota and seems to be an important factor in the success

of the program in that state. In Bismarck, inter-agency meetings between the corps, service, Soil Conservation Service, and state agencies are held biweekly to discuss concerns about proposed discharges. Commenting agencies have an opportunity to become aware of and comment on proposed discharges they may not otherwise have known about. These meetings seem to facilitate better protection of wetlands by facilitating discussions of concerns and practicable alternatives in greater detail than otherwise possible. Regulatory offices of the corps are often located in the same cities as U.S. Fish and Wildlife Service field offices and other resource agency offices, making interagency meetings feasible. These meetings facilitate a better understanding of proposed discharges into wetlands and help maintain good working relations between the corps and other agencies. This approach to permit processing, used extensively in Bismarck, should be used whenever feasible.

Reviews of permitted discharges into wetlands are an important component of the regulatory process. Little follow-up of discharges is done by either the corps or by commenting resource agencies because of lack of time, personnel, and money (W. Bicknell, U.S. Fish and Wildlife Service, personal communication). Documented findings, like those provided by this study, are needed by managers to aid in sound decision-making that improves the Section-404 program and ultimately better protects wetlands.

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A list of current *Resource Publications* follows.

177. Field Manual for the Investigation of Fish Kills, by Fred P. Meyer and Lee A. Barclay, editors. 1990. 120 pp.
178. Section 404 and Alterations in the Platte River Basin of Colorado, by Douglas N. Gladwin, Mary E. Jennings, James E. Roelle, and Duane A. Asherin. 1992. 19 pp.
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